REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1, 4-5 and 7-8 are pending in this application. Claim 1 is independent. The remaining claims depend directly from claim 1.

Rejection(s) under 35 U.S.C. § 103

Claims 1, 4, 7, and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 09-330947 (see also the machine translation and abstract) ("JP '947"), in view of JP 62-004769 (see also the abstract)("JP '769"), JP 56-018643 (See the abstracts) ("JP '643'), JP 07-026235 ("JP '235") and JP 11-343474 (see the abstract and machine translation) ("JP '474"), or Arai (U.S. Patent 5,969,060) (hereinafter "Arai"). This rejection is respectfully traversed.

Independent claim 1 of the present application recites a method for producing an electrical device made up by a first object for bonding including a first electrode and a second object for bonding including a second electrode to be connected to said first electrode, by bonding said first object for bonding and said second object for bonding to each other, comprising the steps of:

- arranging an adhesive, mainly containing a thermosetting resin and a silane coupling agent as a first curing agent, at least on said first electrode, to form an adhesive layer, wherein electrically conductive particles are added to said adhesive from the outset;

- arranging a second curing agent, reacted with said first curing agent by heating to polymerize said thermosetting resin, at least on said second electrode, to form a curing agent layer, said second curing agent being mainly composed of an aluminum chelate;
- positioning said first and second electrodes in register with each other;
- tightly contacting said adhesive layer on said first object for bonding with the curing agent layer on said second object for bonding;
- thrusting and heating said first and second objects against each other to soften said adhesive layer and mix said first and second curing agents and put said electrically conductive particles between said first and second electrodes, and
- further thrusting and heating said first and second objects against each other to develop a cation by reaction of said silane coupling agent as a main component of said first curing agent and said aluminum chelate as a main component of the second curing agent to allow said thermosetting resin to be cationically polymerized.

Thus, according to claim 1, the first curing agent mainly composed of a thermoset resin and a silane coupling agent and the second curing agent mainly composed of an aluminum chelate are arranged on separate objects for subsequent bonding. Therefore, the silane coupling agent and the aluminum chelate do not react and generate cations until the adhesive layer is softened and the first and second objects are thrust together and heated. Because of this separation, cationic polymerization of the thermosetting resin does not occur until the objects are brought together and heated, thereby maintaining long shelf life and high adhesion intensity. The adhesive also cures at low temperatures in a short time.

Further, the present invention intends to improve deformation properties (by elongation or bend of the object) for bonding by heating, as compared to an imidazole curing agent, as well as reduce curing time and improve productivity, as compared to amine or mercaptan curing agents. Specifically, according to the method of the present invention, the adhesive is cured at lower temperatures and at shorter times than related art for the combination of the silane coupling agent and aluminum chelate, *e.g.*, at 120 degrees for 10 seconds. When the silane coupling agent and the alumninum chelate contact, cations are generated by the reaction between the silane coupling agent and the aluminum chelate. In addition, because the thermosetting resin polymerizes by chain reaction from the generated cation, the entire adhesive layer may be cured uniformly, even if the second curing agent is not uniformly dispersed in the adhesive layer.

Because the silane coupling agent and the alumninum chelate are cured at low temperatures in a short time when they are mixed in the same adhesive, the shelf-life of the adhesive is decreased remarkably. To resolve this, the present inventors separate the silane coupling agent and the aluminum chelate on different objects for bonding. Hereby, when the first and second objects for bonding are heated and pressed, the silane coupling agent and the aluminum chelate react for the first time, and the adhesive is cured. Thus, the adhesive of the present application realizes a superior shelf life.

In JP '947, a method for producing an electrical device is disclosed. The method includes arranging an adhesive layer containing a curable resin and electrically conductive particles on a first electrode of a first object, arranging an adhesive layer that does not containing electrically conductive particles on a second electrode of a second object, positioning the first and second

electrodes in register with each other, and with the first and second objects facing each other, tightly connecting the adhesive layer on the first object to the adhesive layer on the second object, thrusting the first and second objects against each other to interconnect the first and second electrodes via the electrically conductive particles, and allowing the curable resin to be polymerized by heating.

The method in JP '947 intends to connect the first and second electrodes via the conductive particles for the purpose of a narrow pitch connection of a semiconductor device and a substrate and for changing the height of electrodes projected from the semiconductor. That is, it is not intended that the adhesive be cured at a low temperature in a short time. Rather, it is clear from JP '947 that the objects are heated and pressed at 170-210 degrees for 20 seconds.

Additionally, because the adhesive layer on the first object (conductive sheet 5) and the adhesive layer on the second object (resin sheet 6) consist of a thermosetting adhesive, they are cured with only their own components when heated. In paragraphs [0012] and [0013], it is described that the adhesive layer on the first object (conductive sheet 5) and the adhesive layer on the second object (resin sheet 6) are deposited on ITO electrode 3 and a surface of LSI 1 for driving liquid crystal each at 100-150 degrees (temporal surface tacking status), showing that the thermosetting adhesive is cured with only its own components. That is, it is difficult for the method of JP '947 to realize that the adhesive maintains the superior shelf life before connecting the electrodes.

Applicant notes that the teachings of JP '769 are limited to application of a principal ingredient of a two-pack adhesive to one object and the hardener / curing agent thereof to the second

object. The method of JP '769 intends to prevent contact by applying the base resin and curing agent on separate substrates for the purpose of bonding the planar conductors without depending on the curing time of the two-pack curable adhesive and generating adhesion irregularity. JP '769 does not indicate the types of resin or curing agent used in the adhesive or the use of a two-component curing agent system for polymerizing the resin. Accordingly, JP '769 also does not suggest that a cation is generated to polymerize the thermosetting resin after a silane coupling agent (as the main component of the first curing agent) is reacted with an aluminum chelate (as the main component of the second curing agent) by thrusting together and heating the two objects on which they are individually applied.

JP '769 does not apply the base resin and the curing agent on separate substrates for the purpose of realizing a superior shelf life of the two curing agents that cure at a low temperature in a short time. This is clear because JP '769 does not indicate the types of resin or curing agent used in the adhesive or the use of a two-component curing agent system for polymerizing the resin. Further, in the embodiment of JP '769, the adhesive is heated and pressed at 100 degrees for 40 minutes. In addition, there is no description of connecting the first and second electrodes through the conductive particles.

According to the method of JP '769, when the base resin and the curing agent are contacted, the curing agent is diffused into the base resin from the adherend surface, and thus the curing agent is gradually cured to form the adhesive layer. When the curing agent is not diffused into the entire base resin, it is hard to cure the entire adhesive uniformly. Therefore, adhesive irregularity occurs. On the other hand, according to the present application, cations are generated

by reaction of the silane coupling agent and aluminum chelate, and the thermosetting resin is cured by the generated cations. Therefore, the thermosetting resin polymerizes like a chain reaction from the generated cations, and the entire adhesive layer can be cured uniformly, even if the second curing agent is not dispersed or diffused into the whole adhesive layer uniformly.

In JP '643, it is mentioned that two-pack adhesives include a solution of first components (an aluminum compound added to an alicyclic epoxy resin) and a solution of second components (a silicone resin added to a similar epoxy resin). When the first solution and second solution are mixed, the aluminum compound and the silicone resin react and are cured promptly at low temperatures (ambient temperatures). However, there is no description that the first and second solutions are applied and preserved on separate substrate to each have superior shelf life and stability. In the third embodiment of JP '643, an example using test pieces is shown, but the example does not disclose a construction that the aluminum compound and the silicone resin are arranged and preserved on separate substrates to have the superior shelf life and stability achieved by the present application.

In the Final Office Action, the Examiner asserts that it would have been obvious to one of ordinary skill in the art to use, as the curable resin of the adhesive layers of JP '947, the two-pack adhesive shown by JP '643 having a long shelf life and quick curing time when mixed used specifically as two layers on the first and second objects as shown by JP '769 such that the adhesive is cured between the two objects when desired.

However, as described above, JP '947 shows that the adhesive layers arranged on the first and second electrodes consist of the thermosetting adhesives that are cured with only their own components by heating. On the other hand, in JP '643, when the first and second solutions are mixed, the aluminum compound and the silicone resin react. The reaction generates cations, and the epoxy resin is polymerized and cured by the cations. Accordingly, it would appear to be impossible to use the first and second components in JP '643 as the two layers as the two layers on the first and second objects for bonding in JP '769 instead of the thermosetting adhesives in the adhesive layers arranged on the first and second electrodes in JP '947.

Further, the Examiner attempts to conclude that the combination of these references teaches that one should apply to a first object the epoxy resin, the first or second curing agent, and the electrically conductive particles, and applying to a second object the other of the first or second curing agent. However, this conclusion is not supported by the references. Rather, no reference has suggested separation of the first and second curing agent. The only separation suggested is between the resin and the curing agent. Thus, the combination of JP '947, JP '769, and JP '643 would apply the epoxy resin on one object and the aluminum compound and silicon compound together on the second object.

JP '235 and JP '474 also do not provide that which JP '947, JP '769, and JP '643 lack. Both of JP '235, which discloses an electrically conductive paste, and JP '474, which discloses an adhesive composition, include a material that contains an aluminum compound and a silicon system compound. However, JP '235 and JP '474 are distinct from the claims of the present application, because as required by claim 1, the aluminum compound and the silicon system

compound are separated from each other, arranged in different adhesive materials. These adhesives produced by the method of JP '235 and JP '474 could not have a superior shelf life because these adhesives do not preserve the aluminum compound and the silicon analogs separately like the present application. Therefore, it is expected that these adhesives show low peel-off strength like the comparative examples 1 and 2 of the present application.

Regarding JP '235, it is described, in one embodiment, that the condition for the curing reaction for the adhesive is set for heating at 200 degrees for 3 minutes. The condition is within the prior art conditions discussed in the present application. Accordingly, it is clear that the purpose of JP '235 is not the curing at lower temperature in a shorter time like the present application.

In JP '474, it is described that the temperature is controlled between 20 and 50 degrees so that the curing reaction does not process while the adhesive is produced. Because the curing reaction by the aluminum compound and the silicon analog might progress if the temperature exceeds 50 degrees, it is not possible to obtain the certain stability. On the other hand, the present application realizes the superior shelf life and stability without controlling the temperature because the adhesive layer including the silane coupling agent and the curing agent layer including the aluminum chelate are preserved on separate objects for bonding.

In JP '474, it is described that an adhesive is coated on a glass substrate uniformly and heated at 120 degrees for 10 minutes. Hydrophilic organic solvent and water of predetermined quantity are added into the used adhesive to improve the curing ability of the adhesive at lower

temperatures. Accordingly, it is not considered that the provided adhesive strength is only caused by the curing reaction of the aluminum compound and the silicone analog.

Arai also does not provide that which JP '947, JP 769, JP '643, JP '235, and JP '474 lack. Rather, Arai is only cited for the proposition that the epoxy resin is solid at ambient temperature and softens at 100 degrees or less.

A *prima facie* case of obviousness requires that all claim limitations be taught or suggested by the prior art. See *In re Royka*, 490 F.2d 981 (CCPA 1974); MPEP §§ 706.02(j), 2143.03. If even a single claim limitation is not taught or suggested by the prior art, then that claim cannot be obvious over the prior art. *Id.* In the present case, none of JP '947, JP '769, JP'643, JP '235, JP '474, or Arai show or suggest the separation of a silane coupling agent and an aluminum chelate on two separate objects. Moreover, not only is there no disclosure of such separation of components, there exists no suggestion, incentive, or foundation for one of ordinary skill in the art to modify the references to arrive at the claimed invention, in violation of MPEP § 2143.01.

Further, the use of this number of references in formulating the rejection indicates that the Examiner, using the present application as a guide, has selected isolated features of the various relied-upon references to arrive at the limitations of the claimed invention. Applicant reminds the Examiner that use of the present application as a "road map" for selecting and combining prior art disclosures is wholly improper. See MPEP § 2143; *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132 (Fed. Cir. 1985) (stating that "[t]he invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time"); *In re Fritch*,

972 F.2d 1260 (Fed. Cir. 1992) (stating that "it is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious .... This court has previously stated that 'one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.'"); *In re Wesslau*, 353 F.2d 238 (C.C.P.A. 1965) (stating that "it is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art")

Thus, because JP '947, JP '769, JP'643, JP '235, JP '474, or Arai, whether considered alone or in combination, fail to show or suggest every claim limitation, as recited in independent claim 1, independent claim 1 is patentable over JP '947, JP '769, JP'643, JP '235, JP '474, and Arai. Dependent claims are patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '947, JP '769, JP'643, JP '235, JP '474, and Arai, as applied to claim 1, and further in view of JP 09-067427 ("JP '427"). This rejection is respectfully traversed.

As shown above, independent claim 1, from which claim 5 depends, is patentable over JP '947, JP '769, JP'643, JP '235, JP '474, and Arai. The Examiner states that it is unclear whether JP '643 teaches the claimed silane coupling agent. Thus, the Examiner cites JP '427 to assert it would be obvious to use the silane coupling agents having an alkoxy group and epoxy ring

as the silane coupling agent in JP '947. However, the teachings of JP '427 are limited to a silane coupling agent modified phenol resin obtained by reacting a specific silane coupling agent with a phenol resin. Nowhere in JP '427 is there a teaching of the separation of a silane coupling agent and an aluminum chelate on two separate objects, as required by claim 1.

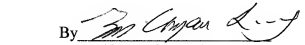
Thus, because JP '947, JP '769, JP'643, JP '235, JP '474, Arai, and JP '427, whether considered alone or in combination, fail to show or suggest every claim limitation, as recited in independent claim 1, independent claim 1 is patentable over JP '947, JP '769, JP'643, JP '235, JP '474, Arai, and JP '427. Dependent claim 5 is patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 17155/003001).

Dated: April 26, 2010

Respectfully submitted,

By 

T. Chyau Liang, Ph.D.
Registration No.: 48,885
OSHA · LIANG LLP
Two Houston Center
909 Fannin Street, Suite 3500
Houston, Texas 77010
(713) 228-8600
(713) 228-8778 (Fax)
Attorney for Applicant